improve them. Better material for correction may be obtained in the next few years.

Ephemeris.

1908·5	270°·3	2″·20	1912·5	256°·4	2″·08
1909·5	267·0	2·18	1913·5	252·6	2·04
1910·5	263·6	2·15	1914·5	248·6	2·00
1911·5	260·1	2·12	1915·5	244·4	1·96

Orbital Elements of Double Stars. By T. J. J. See, Ph.D.

The following orbits have been communicated by Dr. See. The material on which they are based is for the most part to be found in Burnham's *General Catalogue.*

Σ 2.

R.A. $0^h\ 4^m$ Dec. $+79°\ 10'$

Discovered by W. Struve in 1828. Always a close pair, and measures are therefore difficult with small or moderate apertures. An orbit was found by Glasenapp using measures to 1893. It was again measured by Biesbroeck in 1904.

P =	166·0 years	☊ =	168°·3
T =	1894·50	ι =	72·3
e =	0·40	λ =	0·0
a =	0″·65		

β 524 = 20 Persei.

R.A. $2^h\ 47^m$ Dec. $+37°\ 55'$

The principal component of the wide pair Σ 318. It was discovered by Burnham in 1878 and is always difficult. It is assumed that Burnham's angle in 1878 should be altered by 180°. All the observations are represented except the distance 0″·22 by Lewis in 1896. It is not probable that the orbit given is more than a good approximation.

P =	36 years	☊	indeterminate
T =	1897·0	ι =	0°·0
e =	0·75	λ =	149·6 = Periastron
a =	0″·16		

Σ 483.

R.A. $3^h\ 57^m$ Dec. $+39^\circ\ 14'$

Discovered by W. Struve in 1830. There are in all 20 measures down to 1904, and in 1906 it appeared single to Burnham in the 40-inch. Early observations are important as soon as separation occurs.

P =	135·5 years	☊ =	23°·1
T =	1907·75	ι =	68·0
e =	0·786	λ =	213·4
a =	1″·77		

β 883.

R.A. $4^h\ 46^m$ Dec. $+10^\circ\ 54'$

Discovered by Burnham in 1879. A long series of measures is available, and Professor Aitken has communicated those of 1907 and 1908.

P =	16·6 years	☊ =	33°·5
T =	1907·33	ι =	35·7
e =	0·47	λ =	197·3
a =	0″·24		

β 581 AB.

R.A. $8^h\ 0^m$ Dec. $+12^\circ\ 35'$

The close pair of a triple system discovered by Burnham in 1878. The distance never exceeds 0″·5, and the object is difficult, but the measures are numerous and good. A few have been rejected. The comes is now passing periastron, and measures, though difficult, will be valuable.

P =	41·2 years	☊ =	133°·7
T =	1909·10	ι =	63·1
e =	0·53	λ =	278·1
a =	0″·61		

AC 5 = 8 Sextantis.

R.A. $9^h\ 48^m$ Dec. $-7^\circ\ 38'$

Discovered by Alvan Clark in 1852. The angles given by Dembowski, by the Cincinnati observers in 1878, and by Hall in 1879 have been reversed. There is a systematic run of negative

residuals in angle in the second quadrant, but the available material is not sufficient to justify a modification of the elements.

P =	68·75 years	☊	indeterminate
T =	1882·0	ι =	0°·0
e =	0·60	λ =	240°·6 = Periastron
a =	0″·35		

Σ 3123.

R.A. $12^h\ 1^m$ Dec. +69° 15′

Discovered by W. Struve in 1831. The early measures are few and not very accordant. The early angles have been altered by 180°, as suggested by Lewis. With this proviso an arc of 300° has been described since Struve's measures.

P =	103·3 years	☊ =	56°·9
T =	1860·50	ι =	49°·7
e =	0·49	λ =	79°·1
a =	0″·32		

ξ Bootis = Σ 1888.

R.A. $14^h\ 47^m$ Dec. +19° 31′

Discovered by Herschel in 1780 and followed regularly. No orbit given as yet represents all the observations. The measures are given in Lewis' *Memoir* and in Burnham's *General Catalogue*.

P =	143·0 years	☊ =	171°·6
T =	1909·36	ι =	45°·8
e =	0·546	λ =	34°·1
a =	5″·02		

Dembowski 15.

R.A. $16^h\ 41^m$ Dec. +43° 40′

Discovered by Dembowski in 1869. The measures are good, and distributed over an arc of 192°.

P =	96·0 years	☊ =	145°·7
T =	1898·0	ι =	66°·05
e =	0·35	λ =	168°·3
a =	0″·84		

Σ 2438.

R.A. $18^h\ 56^m$ Dec. $+58°\ 5'$

Discovered by Herschel in 1782, and re-examined the next year. Re-measured by Sir John Herschel in 1830, and afterwards followed by several observers. As periastron was passed about 25 years ago, it will be many years before the present elements can be improved. The eccentricity is higher than that of any other known double star except Σ 2525.

P = 233·0 years		☊	indeterminate
T = 1882·50		ι	= 0°·0
e = 0·916		λ	= 178·3 = Periastron
a = 0″·53			

Secchi 2 = Σ 2481 BC.

R.A. $19^h\ 8^m$ Dec. $+38°\ 36'$

The companion of Σ 2481, found to be a close double by Secchi in 1858. Measured by Otto Struve in 1866, and by Schiaparelli in 1876; there are no measures between 1881 and 1897, since which time it has been followed by Aitken. Aitken's angles before 1901 are altered by 180°.

P = 16·0 years		☊	= 109°·7
T = 1902·25		ι	= 63·5
e = 0·68		λ	= 218·3
a = 0″·39			

The Radius of the Moon for libration $-4°\cdot5$. By Walter Heath.

Dr. L. Struve, in his reduction of the occultations observed during the lunar eclipses of 1884 and 1888 (*Dorpat Observatory Publications*, vol. XX.), made a table of the values of the radius of the Moon's limb at different position-angles; a similar table was published by me last year (*Ast. Nach.*, 4206), including more observations, the geocentric libration in longitude being within the limits $-3°\cdot3$ and $-5°\cdot3$.

I have drawn the diagrams below in order to compare the figures in this table with the results obtained by Dr. Hayn from his micrometer measurements at the Leipzig Observatory (*Selenographische Koordinaten*, III Abhandlung, Leipzig, 1907). In the diagrams the figures at the side are for measuring the radius, and those at the bottom denote position-angles; the dotted line shows the values taken from Dr. Hayn's table, and the other line indicates the occultation results. The zero from which the occultation radius is measured is the Moon's centre as determined